

*The Development of the Intestinal Gregarines of Marine Worms.*

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The Gregarines with a single segment, which are very frequently met with living freely in the digestive tract of a large number of Annelids, have hitherto been considered to be Monocystidea.

The study of the development of *Doliocystis nereidis*, parasitic in the intestine of *Nereis cultrifera*, and of *Doliocystis polydoræ* from the intestine of *Polydora Agassizi*, shows that these Gregarines are in reality Dicystidea, exhibiting in their earliest youth the intra-cellular stage, followed by a stage of budding which gives rise to the Gregarine proper. During the budding stage the Gregarine always exhibits two segments—the intra-cellular segment, or *epimerite*, and the extra-cellular segment, in which the nucleus is contained. It is therefore at this moment only that the Gregarine appears as a true Dicystid; but this condition does not last long. At a very early period the young individuals drop their epimerite and become free in the intestine, when they exhibit all the characters of true *Monocystis*, with which they have hitherto been confounded.

In order to study the development of *Doliocystis nereidis* it is necessary to examine with much care the elements of the epithelial lining of the digestive tract of the *Nereis*, especially in its anterior third. Individuals will then be met with which are extremely young and still in the Coccidiid stage, that is to say, in the state of a simple spherical nucleated mass, situated between the nucleus of the cell and the surface. In the subsequent stages the primitive Coccidiid has budded forth a segment, which makes its way into the lumen of the digestive tract, and which is destined to form the Gregarine proper. Finally, in a still more advanced stage the Gregarine is definitively constituted; the extra-cellular bud has considerably increased in size, and a layer of transverse muscular fibrils has already become differentiated, while the intra-cellular portion, on the contrary, is reduced to the condition of a simple little knob (epimerite). Conditions such as this are met with pretty frequently in the preparation, and we may even observe free individuals of which the epimerites are still capped with the shrivelled epithelial cells; this is the *Cephalin* stage, which is soon concluded by the falling off of the epimerite, to give place to the stage of the *Sporadin*. The Gregarine is henceforth free in the intestine, in the form of an ovoid or elongated *Monocystis*, more or less drawn out into a point at one of the poles.

The development of *Doliocystis polydoræ*, a new species which I have met with in the Bay of Marseilles, takes place in precisely the same manner; only the epimerite is developed to a greater extent than in the preceding species; moreover it persists for a long time, the result of which is that Cephalins of this species are commonly encountered. This epimerite is in the form of an inverted frustum of a cone, and it is directly continuous with the anterior extremity

of the second segment, which is elongated in the shape of a neck. At the moment of the falling-off of the epimerite, which is easily observed under the microscope, a broad wound is produced by which granulations of the endocyte make their escape; but this promptly cicatrizes, and the Gregarine soon no longer exhibits any traces of its first segment—it has passed into the *Monocystis* stage.

The development of these two species is thus identical with that of the genus *Schneideria*, which we may justly consider as the most perfect type of the Dicystid Gregarines. The only difference consists in the fact that the epimerite always remains very simple and rudimentary in *Doliocystis*, while in *Schneideria* it attains a certain degree of complication. Moreover it is interesting to note that, in a general way, the epimerites of the marine Gregarines never exhibit so high a degree of differentiation as do those of the majority of the terrestrial forms; they all belong, at least in the species which I have studied hitherto, to the group of the *regular simple epimerites*.

The free stage is succeeded in *Doliocystis* by encystment and sporulation, which take place normally as in the other Polycystidea. The cysts of *Doliocystis nereidis*, which I have succeeded in cultivating in spite of their extremely small size, give rise when mature, by means of simple rupture, to oval corpusculated spores, measuring  $7\ \mu$  in their long axis by  $5\ \mu$  in their short axis. They exhibit a remarkable thickening of the wall at one of the poles, which is a very important character in my opinion, since it is also common to the spores of the genus *Schneideria*.

Thus we see that the Gregarines with a single segment from the digestive tract of marine worms exhibit the same mode of development and the same form of spores as do the typical Dicystidea; it is therefore in this group that they must in future be placed, and it is necessary to distinguish them henceforth from *Monocystis* proper, the development of which is entirely different, and which, moreover, inhabits almost exclusively the general body-cavity.

While retaining the generic name of *Monocystis* for these latter forms, I propose to unite the former, that is to say the *pseudo-Monocystis* of the digestive tract of worms, under the common generic name of *Doliocystis*; as regards their specific name, this will be very well indicated by the name of the host which harbours them. We shall have *Doliocystis nereidis* for the Gregarine of *Nereis*, *Doliocystis polydora* for that of *Polydora*, &c.

Thus the confusion resulting from the union under the same name of genera essentially distinct will cease, and the group Dicystidea will therefore comprise two important genera:—

(1) The genus *Schneideria*, peculiar to the digestive tract of terrestrial Arthropods;

(2) The genus *Doliocystis*, peculiar to the digestive tract of marine worms.—*Comptes Rendus*, t. cxvi. no. 5 (January 30, 1893), pp. 204-206.